# Physics Challenges for Teachers and Students


***A Worldwide Problem-Solving Contest***

## The Power of One (M1)

A loop of copper wire is placed in the vicinity of a working transformer. As a result of the induced emf, there is a current in the loop. The phase shift between the current in the loop and the current in the transformer is $\pi/4$. The power dissipated in the loop is $P$. What power $P'$ would be dissipated if the loop were made of nichrome instead? Assume that wire thickness as well as the size, the shape, and the location of the loop remain unchanged. (We leave it to you to locate the relevant reference information.)

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**Submission Guidelines:**

The deadline for submitting solutions to this problem is May 16, 2005.

- only email submissions will be considered;
- email your solutions to Boris Korsunsky at korsunbo@post.harvard.edu;
- please email the solutions as Word files;
- please email *each solution* as a separate file;
- note that each problem, in addition to a very clever title, has a code such as M1. Please name each file as "problem code-first initial-last name." For instance, "M1DVader" if your name is Darth Vader and you are sending the solution to problem M1;
- please state your name, hometown, and professional affiliation in each file.

We look forward to your (and your students') participation.

**Please send correspondence to:**

Boris Korsunsky
korsunbo@post.harvard.edu

The next *Challenges* problem will be posted online May 9.